Solar Dryer Guide

Design adapted from Blue Mangoes for Haiti (https://www.bluemangoesfruit.com/)
See Pages 5-15 for the original Blue Mangoes design.

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Total cost for one unit was about $500, including labor cost and 10 shelves.

Solar dryer supply list

- 2000 HTG - cement 4 bags
- 1250 HTG - 50 blocks
- 20 - 3 gallon buckets sand
- 5 buckets gravel
- $40 sheet metal 4 X8' (needs to be galvanized sheet metal, which may be more expensive. Can find it at A & B Hardware near the international airport in Pap).
- $120 – 16, 1 X 4" wood, 16' long (will actually need more wood for the trays. This is just for the solar dryer box)
- 500 HTG – box of nails. Next time use galvanized!
- Staples/ staple gun
- $20 Tarp – 9.5' X 13'
- 5500 HTG tarp – 19' X 16'
- $6 – Transparent plastic, 10 meters long X 1 meter+ wide (consider plastic corrugated roofing material at CK Hardware in Pap)
- 3" PVC – 3'long and 3" 90° elbow
- $60 – Screen mesh, 3' X 100'

Construction Steps. Cement base (4X8’) is larger than Blue Mangoes design:

Galvanized sheet metal (don’t use standard metal it will rust!):

Wood frame. We used 5 vertical supports because of the larger base. We also used thicker wood for more strength and less vertical cutting:

Wrap in strong plastic, or other clear barrier, keep space on sides for access:

Install tarp as a “flap door” on both sides and dark tarp on the back to absorb sun:

We purchased an extra tarp to cover the entire unit when not in use:

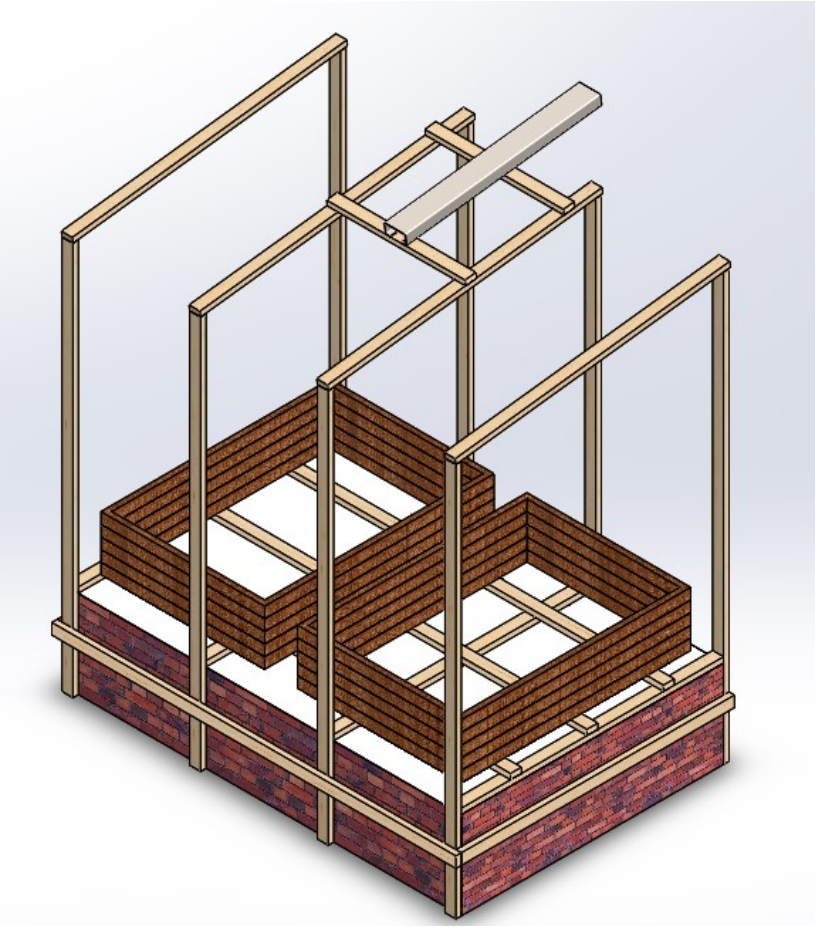
Screen to keep flies from entering vent space at bottom. We will be making a cement patio surrounding the unit to reduce ants:

The trays/shelves for drying the mango are made of 1 X 4” wood, cut lengthwise down to 1X2”, then plastic screen mesh (the same material used for window screens) is used as the surface:

2 shelves can be placed side by side in the unit. Multiple shelves can be stacked on top of each other. Possibly up to 5, for a total of 10 shelves. Testing is under way to determine the optimal amount.

Passive Solar Fruit Dehydrator

Construction Manual



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The Blue Mangoes Story

To empower rural small holders and do other important stuff that Josh will make sound pretty.

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Site Conditions and Layout

For the dehydrator to work, it needs two important things: direct sunlight, and open airflow. We have put a dehydrator at the edge of a mountain in Jamaica so that it had good airflow. We have also put it in an open field near a house in the United States.

The dehydrator should be placed on a relatively flat surface without anything that could cast a shadow near it. In the Northern Hemisphere, it should face True South. In the Southern Hemisphere, it should face True North.

The dehydrator must also not be in a low place. Standing water can rot the wooden supports, and there is less airflow. The fruits must be washed with clean water, sliced, and put on trays. The dried fruits must be put in bags, and the trays need to be cleaned. The dehydrator should be near tables (a workstation) to help with this.

BOM and Alternatives

Item #	Material	Qty	Alternatives
1	Bricks	120	
2	Thin Metal Sheet; 72” x 48”	1	
3	Square Tubing; 2”x4”; 36” long	1	PVC Piping
4	1” x 2” lumber; 72” long	7	
5	1” x 2” lumber; 78” long	4	
6	1” x 2” lumber; 48” long	4	
7	1” x 2” lumber; 50 1/2” long	4	
8	1” x 2” lumber; 25 3/8” long	2	
9	1” x 2” lumber; 74” long	2	
10	1” x 2” lumber; 50” long	2	
11	Roll of Clear Plastic Sheeting	1	

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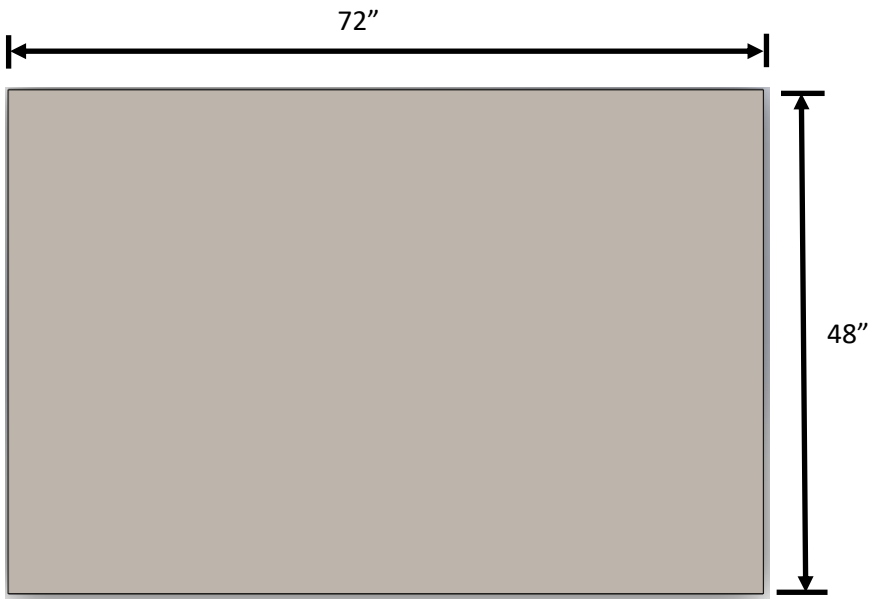
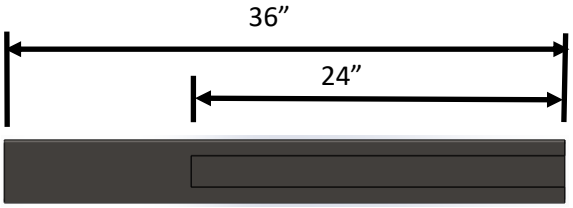
Metal Sheet



Measurements for the dehydrator can be adjusted depending on the size of the thin metal sheet.

Chimney



Cut slot in 4”x2” square tubing for chimney.

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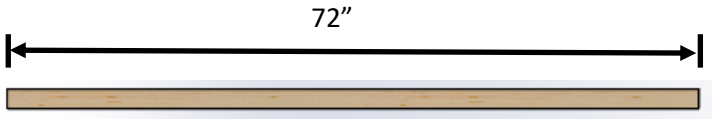
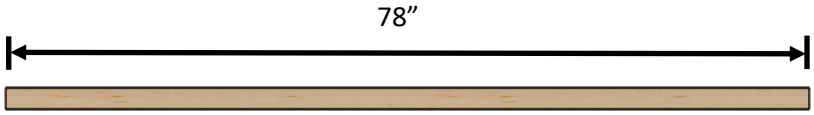
1”x2” Cuts

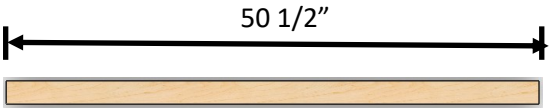


X 4 Front vertical support

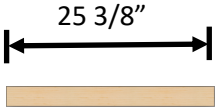


X 4 Back vertical support

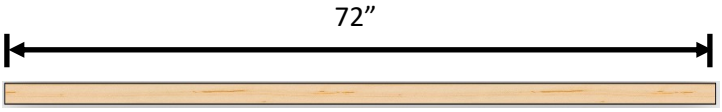
X 4 Middle horizontal support



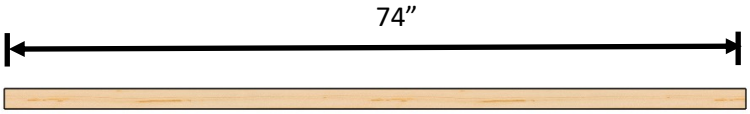
X 4 Top horizontal support



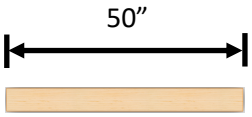
X 2 Top chimney support



X 3 Horizontal tray support



X 2 Tunnel Spacer



X 2 Side support

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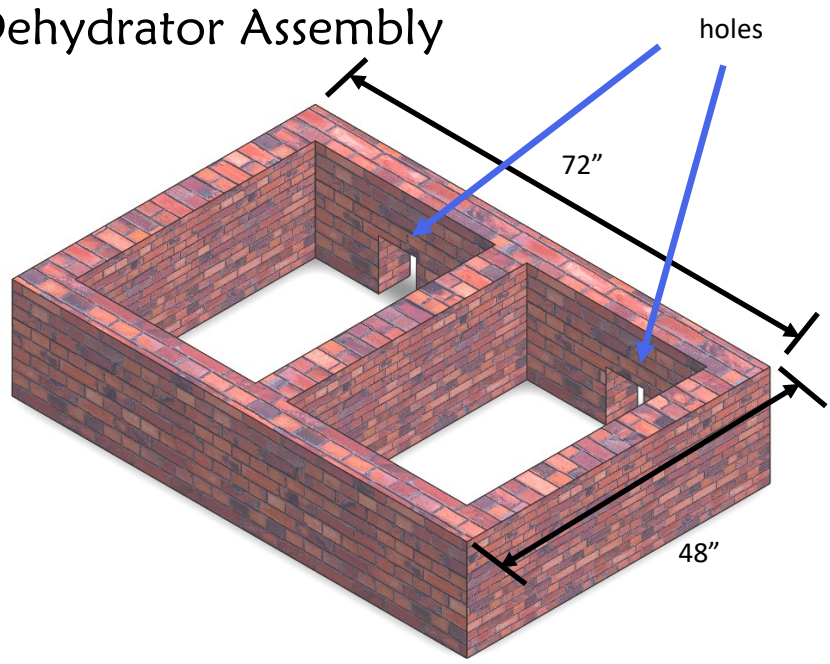
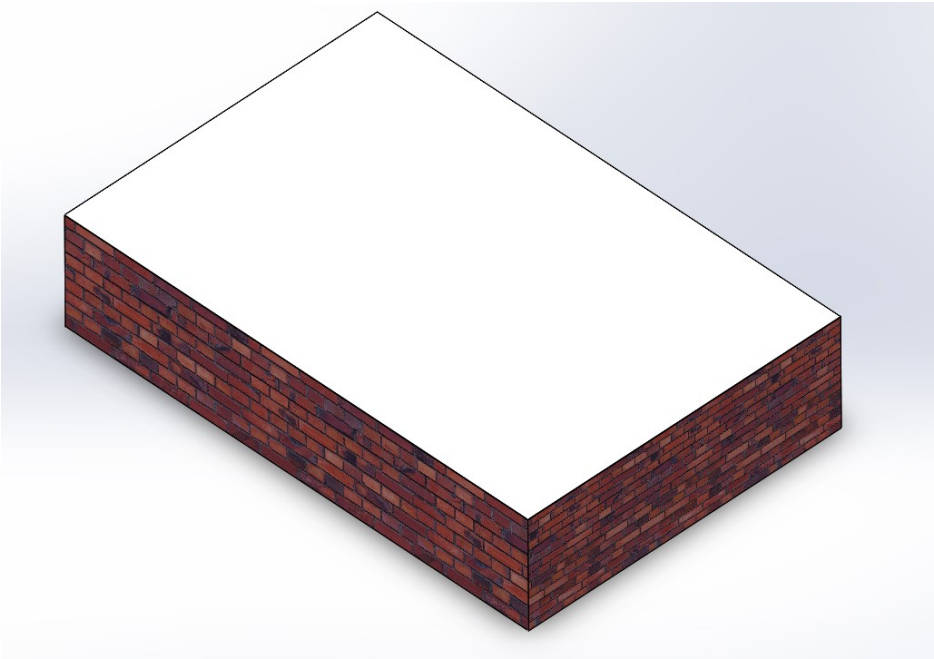
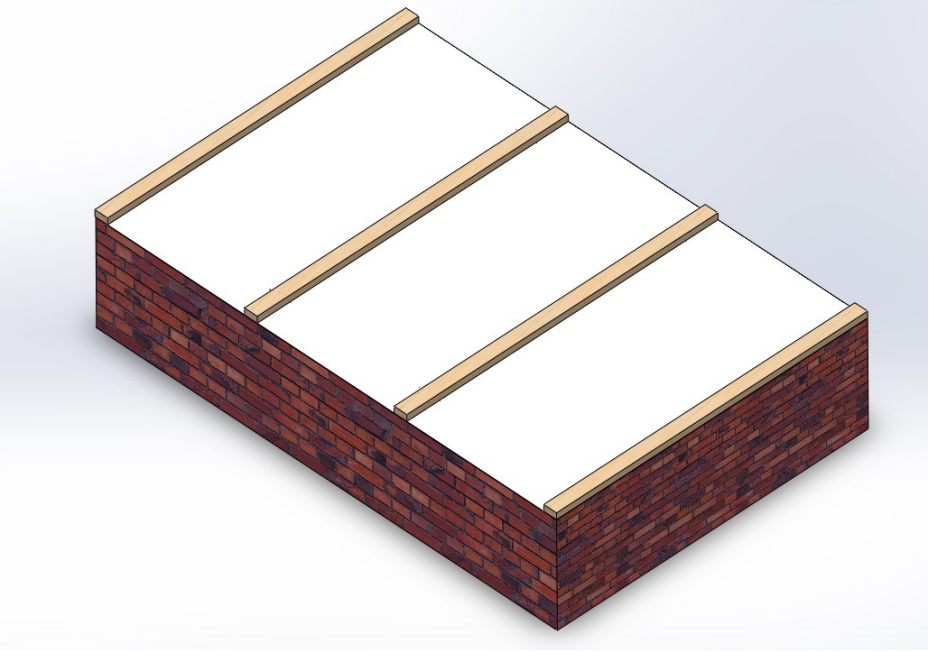
Dehydrator Assembly



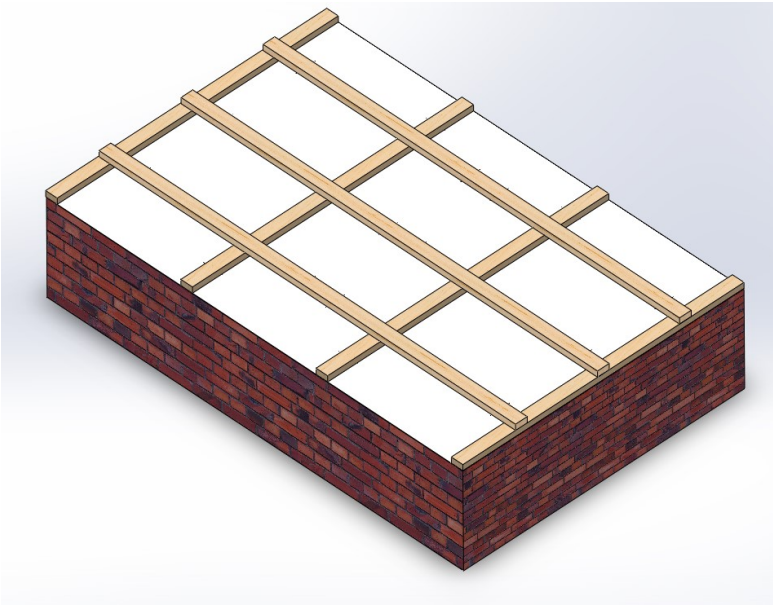
1. Build brick base. Base should have the same exterior dimensions as the metal plate bottom. Two holes should also be knocked in the back to allow for charcoal to be placed under the metal plate.



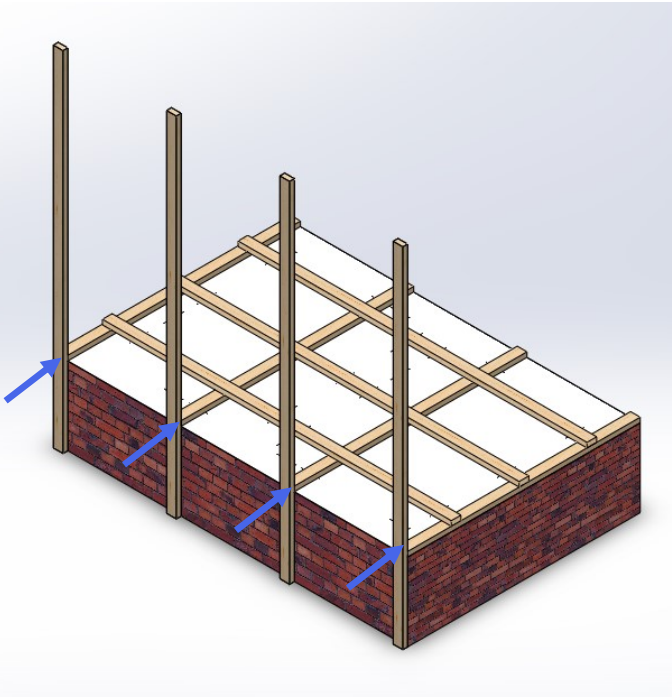
2. Place metal plate on brick base. Ensure all sides are flush.



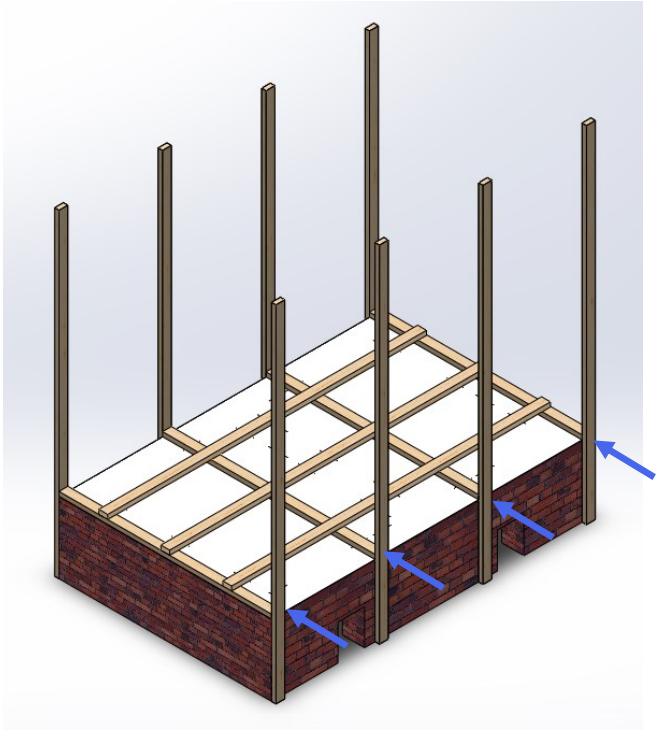
3. Place four horizontal middle supports across evenly spaced, 23 3/8” apart. Outside supports should be flush with brick.



4. Attach three tray supports to the horizontal middle supports. Supports should be centered and spaced 14” apart.



5. Attach 72” support to front side of dehydrator. Anchoring it to the horizontal middle supports.



6. Attach 78” support to back side of dehydrator, the side with the holes for the charcoal. Anchoring it to the horizontal middle supports.

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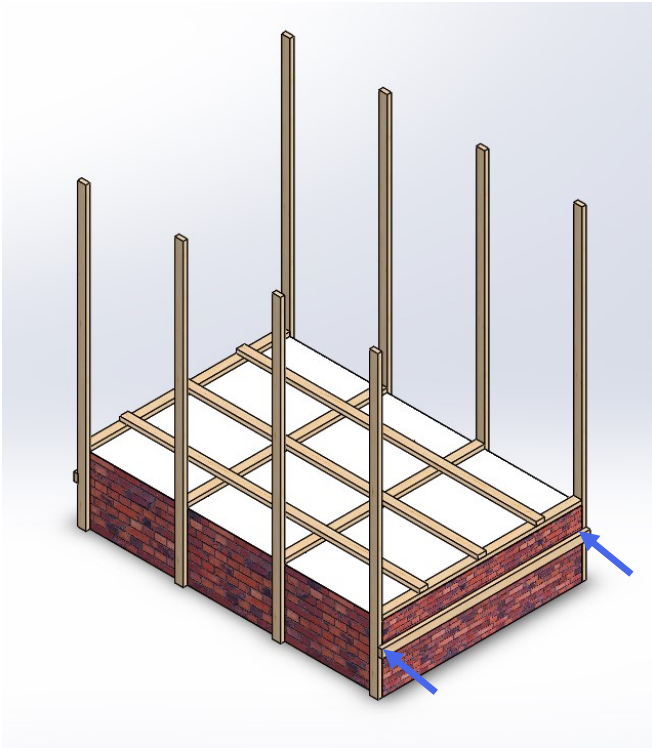
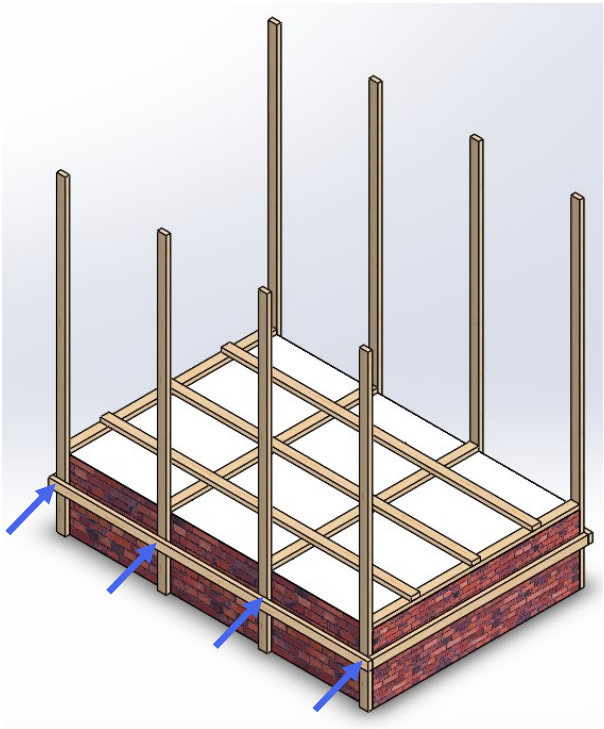
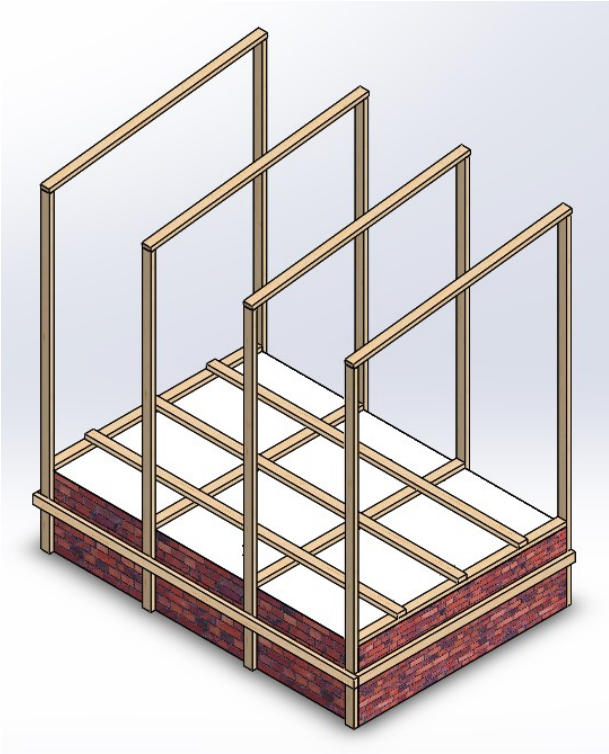


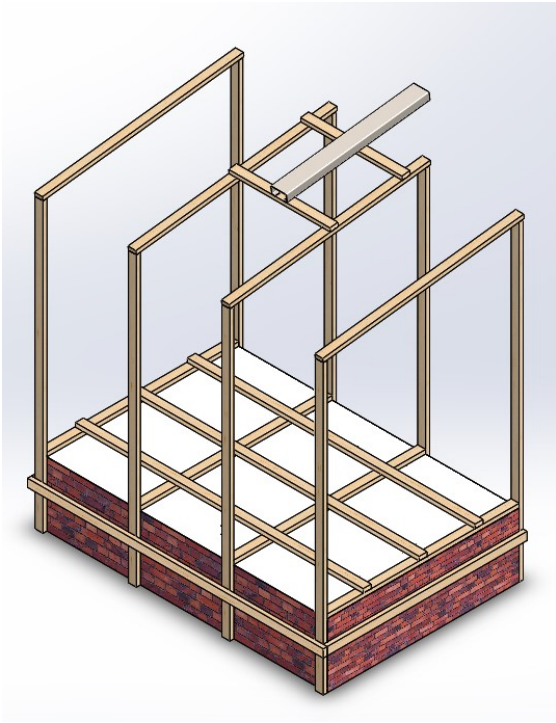
7. Add side supports to each side of dehydrator. Ensure they are flush to the vertical wooden supports. Attach to both front and back vertical supports. Repeat on both sides.



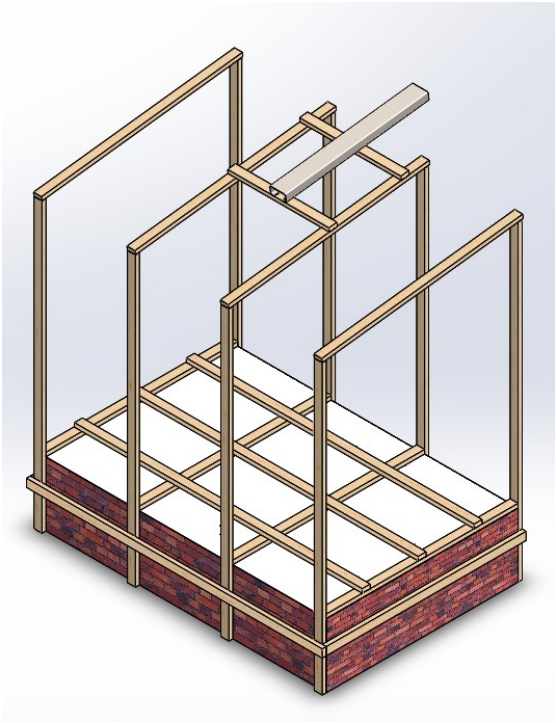
8. Attach tunnel spacers to each long side of the dehydrator. Ensure they are flush to the outside of the side supports. Attach to each vertical support.



9. Attach top supports. Supports might need to be cut at an angle to fit. Cut as necessary.



10. Attach the two chimney supports and chimney.



11. Wrap frame tightly with plastic tacking with nails.

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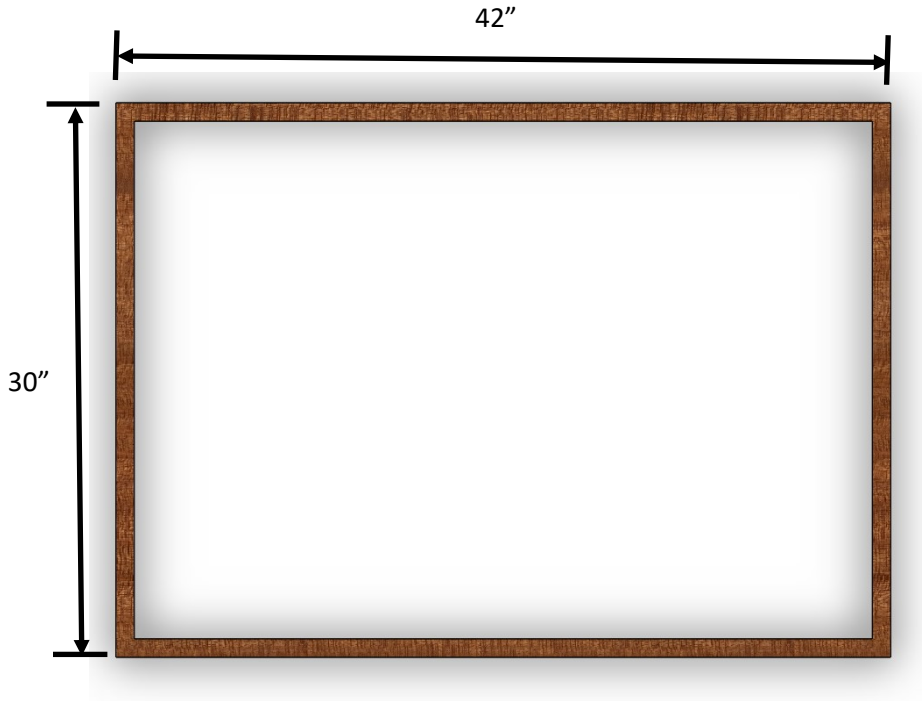
Trays



1. Use 1” x 2” to create a tray frame.
2. Attach food grade mesh to trays to support the drying fruits.
3. Produce as many trays as needed.

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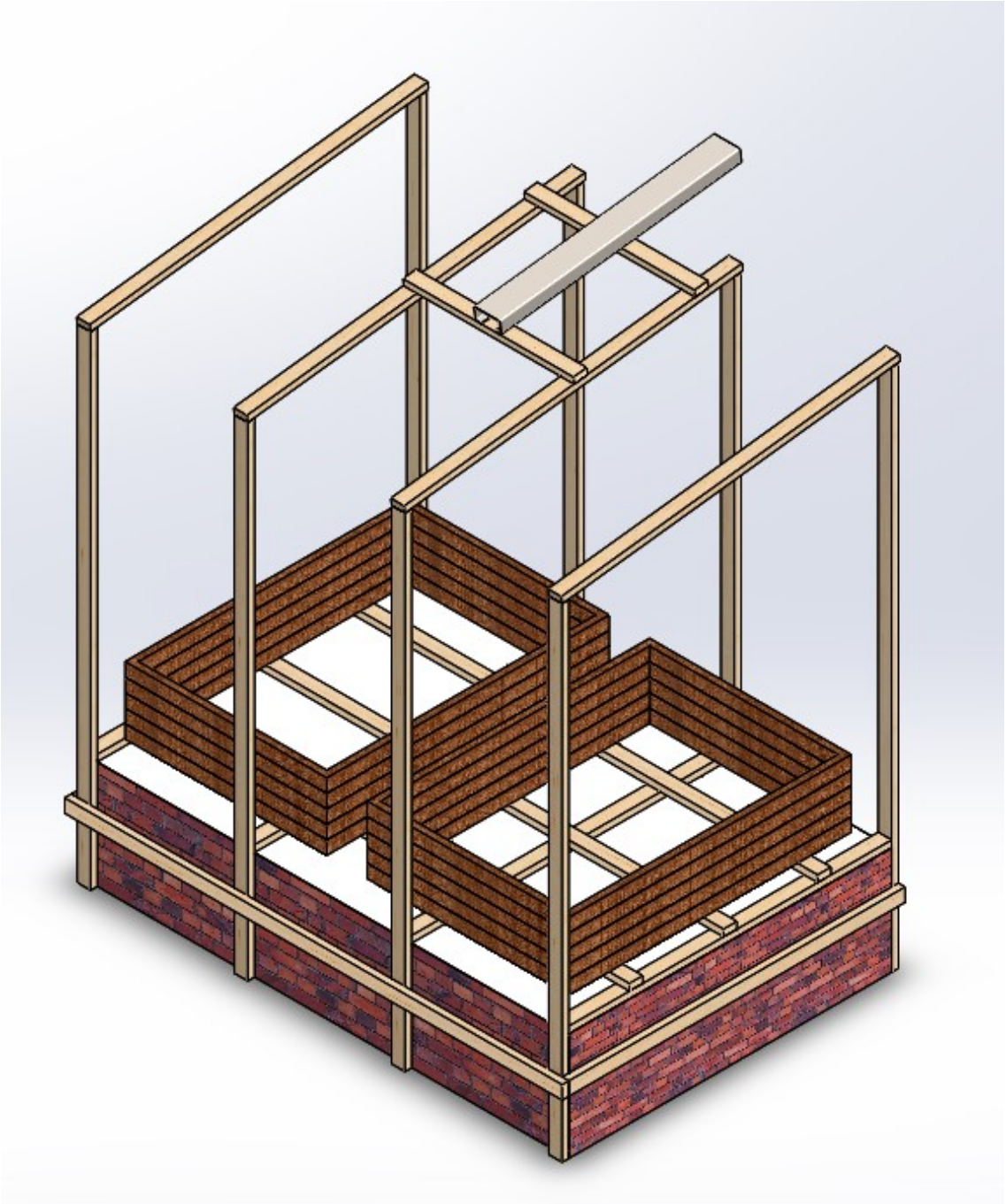
Final Dehydrator



Operating Instructions

Drying fruit is a form of food preservation. Removing the moisture from the fruit keeps it from spoiling for a long time, but also takes away some nutrients. The way that fruits are dried affects how much nutrients are left.

Do not use rotten or sick fruits—drying a bad fruit does not make it better. You must use good fruits, and wash them before they can be dried. This dehydrator cannot dry meats. The temperature is not high enough to be safe to dry meats for long-term preservation. **Do not use this dehydrator to dry meats**.

When handling the fruits, keep your hands washed and clean. Slice the fruits in thin slices, and use trial and error to find the best size for them to be sliced at. Thick slices will take longer to dry, and will have some moisture left over. Thin slices do not take long to dry, and may become "crispy." We suggest starting with slices of ¼" or smaller. When the mango is sliced, remove the excess moisture from the slices with a washcloth or equivalent.

When placing the fruits on the trays, do not have slices overlap. Fruit slices along the edge of the chamber will dry slower than fruit in the center. Use trial and error to find the best uses for the entire chamber space. Our advice is to put thicker slices toward the center, and thinner slices on the edge.

Trays toward the bottom of the chamber will dry faster than trays at the top. Use trial and error to find if you need to rotate trays during the day, or between days. The color of most dried fruits is darker. You can tell that the fruit is dry when it is not moist to the touch. Put the dried fruit in airtight bags to preserve them and protect them from insects. Mark the date that the fruit was pulled from the dehydrator on the bag.

Maintenance

Cleaning

The dehydrator and all its parts must be kept clean. This will help keep it working, and keep the dried food safe to eat. Cleaning is simple, and can be done after every batch of dried fruits.

The top of the chamber (where the sun shines through) should be kept clean of dirt and debris. The dirt and debris can stop the air from heating up in the tunnel.

The chamber should be cleaned and allowed to air-dry after a batch of fruits. The juice and aroma of the fruits, and damp and dark inside, attract insects and spiders. Cleaning the juice and airing-out the chamber will help prevent insects. The trays should be washed with water and air dried after every batch of fruits, too.

Repair

The dehydrator should be sturdy, and is not likely to need many replacements. However, the bug proofing, trays, and see-through panel on the tunnel should be regularly checked for tears and cracks.

Bug proofing is the most important, and should be replaced immediately. If the paint is beginning to crack, it should be removed, and a new coat of paint should be applied. If the roof begins to rust, it should be replaced. If there is a leak in the chamber, it should be sealed using wood, metal or putty; the plastic vapor barrier; and insulation.